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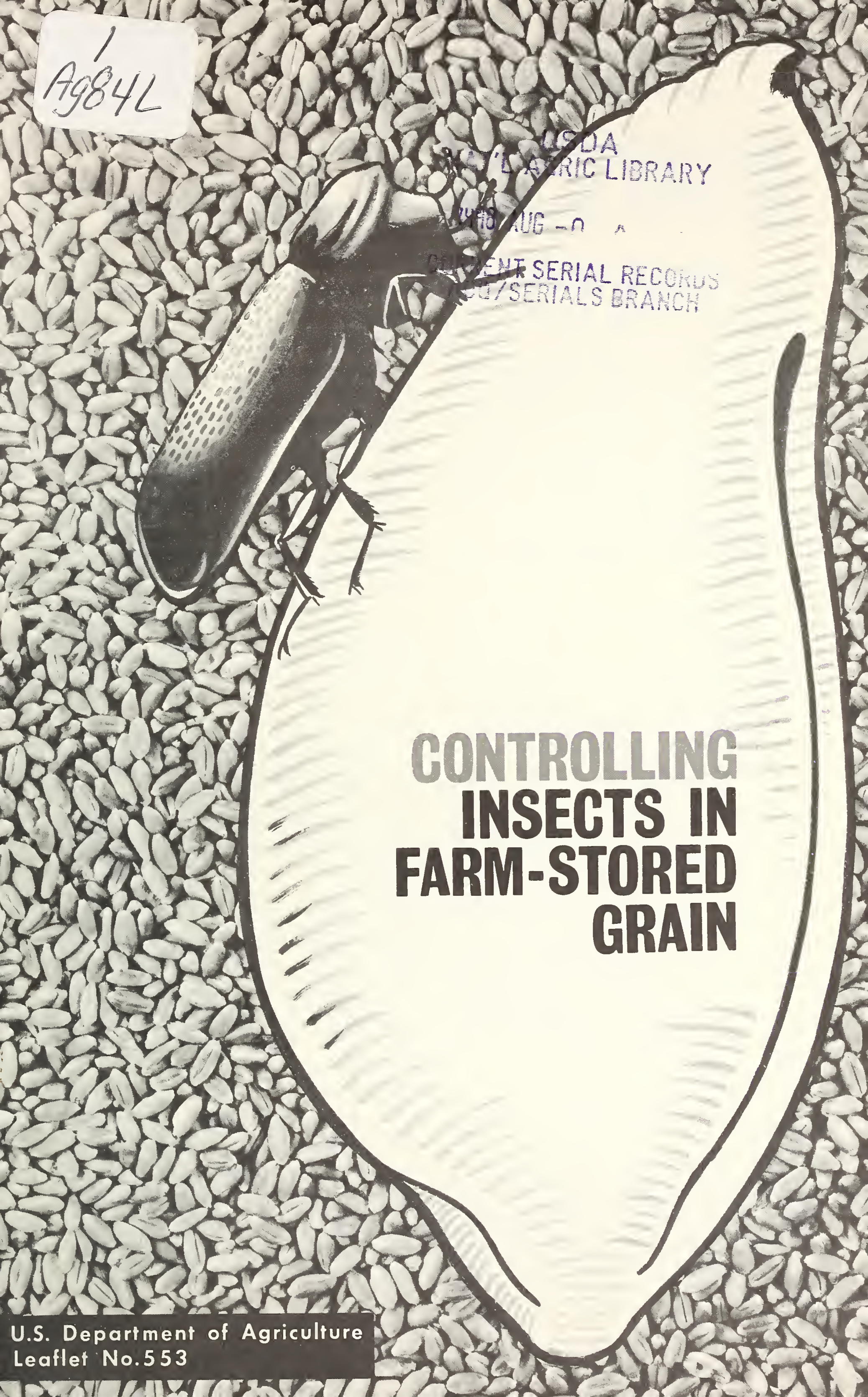


CONTROLLING INSECTS IN FARM-STORED GRAIN

U.S. Department of Agriculture
Leaflet No. 553

CONTROLLING INSECTS IN FARM-STORED GRAIN

If you store wheat, oats, barley, rye, grain sorghum, shelled corn, or other grains on your farm, insects will cause damage unless you protect the grain. To do this, you must—

- Clean your storage bin and the area around it;
- Spray the bin before you put grain in it; and
- Treat and inspect the grain regularly.

Storing grain when it is dry also discourages insects from infesting it. Try to store grain that has a moisture content of less than 12 percent. Keep it dry by storing it in tight, weatherproof bins.

Insect attack on stored grain varies from region to region (see map). Damage is heaviest in region 4, where long summers and high temperatures permit development of many insect generations during the year. In colder climates, stored-grain insects are generally fewer and less troublesome. However, a large infestation can heat up the grain and remain active, even in cold weather.

The rice weevil, the red flour beetle, the lesser grain borer, the saw-toothed grain beetle, and the granary weevil are some of the most destructive insect pests of stored grains. Many other kinds of insects are numerous and destructive at times.

You will find detailed descriptions of insects that attack stored grain in Farmers' Bulletin 1260, "Stored-Grain Pests," available free from the Office of Information, U.S. Department of Agriculture, Washington, D.C. 20250. Send your request on a post card. Please include your ZIP code number in your return address.

If you follow the practices recommended in this leaflet, you can prevent serious insect damage to your grain.

CLEAN THE BINS

Insects live from season to season around farm buildings in accumulations of grain, feed, straw, hay, and litter.

You should clean grain bins thoroughly at least 2 weeks before putting grain in them. Clean wooden bins very carefully, because grain and dust tend to collect in their walls and floors and encourage infestations.

Remove all leftover grain from bins and sweep down the walls, ceiling, sills, ledges, and floor. Outside, remove accumulations of spilled grain from under and around bins. Clear trash and litter from the bin area.

Feed rooms, feedbins, stables, mangers, and animal feeders harbor many insects that are likely to spread to bins of grain. Do not store grain near them. Wagons, trucks, combines, and other farm equipment in which waste grain accumulates can also be sources of infestation.

SPRAY THE BINS

After you have cleaned the bin, apply a surface spray to all surfaces inside and, if possible, outside the bin. Surface sprays leave a thin layer of insecticide that kills insects that crawl over it.

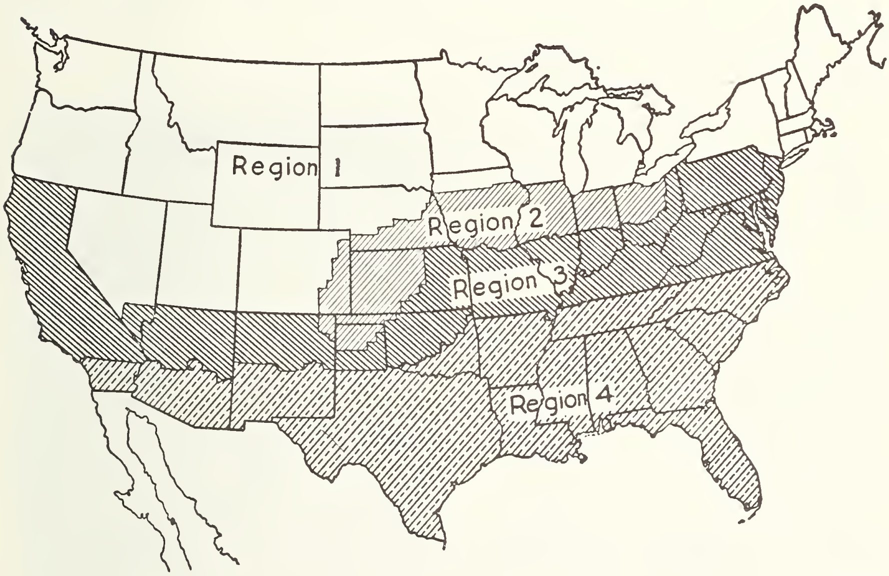
Thoroughly spray seams, corners, and cracks where particles of grain accumulate. You can use a garden sprayer or a power sprayer. Spray the bin at least 2 weeks before you fill it.

To make enough spray to treat 1,000 square feet, use one of the following mixtures:

USE FRESH SPRAY

When you use a spray mixture to treat the bins, to treat the grain while binning, or as a surface dressing, mix only one day's supply at a time—in a clean, rust-free container.

Do not use sprays that have set overnight after being mixed with water.



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The map shows, by regions, the degree to which farm-stored grain in the United States is subject to insect attack: Region 1, little if any damage occurs to grain on the farm during the first season's storage. Region 2, insects may be troublesome during the first season. Region 3, insects are troublesome every year. Region 4, insects are a serious problem throughout the storage period.

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Sweep down the walls and ceilings thoroughly when you clean the bins.

- ½ pint of 57-percent premium-grade malathion emulsifiable concentrate and 2 gallons of water.
- 12 ounces of 50-percent methoxychlor wettable powder and 2 gallons of water.
- 1 quart of 25-percent methoxychlor emulsifiable concentrate and 2 gallons of water.
- 1⅓ pints of 6-percent pyrethrins combined with 60-percent piperonyl butoxide and 2 gallons of water.

TREAT THE GRAIN

After you have thoroughly cleaned and sprayed the bins, you can take further steps to protect against insect infestation. You can—

(1) Apply insecticide to the grain as it goes into the bin;

(2) Apply a surface dressing to the grain after it is in the bin; or

(3) Fumigate the grain to disinfest it.

While Binning

Insecticide spray or dust applied uniformly to grain as it goes into the bin protects against insect infestation for about one season.

Because of the warm climate in region 4, sprays or dusts are less effective there than in other regions.

Sprays.—You can apply sprays with hand sprayers, compressed-air sprayers, or sprayers operated from motor-driven pumps. You can also apply the spray mixture by letting it drip into the grain as it enters the auger.

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Sweep the floor of the bin to remove grain and dust.

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Applying protective spray to grain as a surface dressing.

To make enough spray for treating 1,000 bushels of grain, mix one of the following:

- 1 pint of 57-percent premium-grade malathion emulsifiable concentrate and 3 to 5 gallons of water.
- 1 quart of 6-percent pyrethrins combined with 60-percent piperonyl butoxide emulsifiable concentrate and 3 to 5 gallons of water.

Dusts.—Use a hand-operated duster to apply one of the following:

- 60 pounds of 1-percent premium-grade malathion dust on wheat base.
- 75 pounds of 0.08-percent pyrethrins combined with 1.1-percent piperonyl butoxide dust on wheat base.

Surface Dressing

Insecticide spray applied to the surface of stored grain protects against moths and helps prevent other insects from entering the grain. Surface treatment, however, does not get rid of an infestation already established below the surface of the grain.

To make enough spray to treat 1,000 square feet, mix one of the following:

- ½ pint of 57-percent premium-grade malathion emulsifiable concentrate and 2 to 3 gallons of water.
- 8¾ ounces of 6-percent pyrethrins combined with 60-percent piperonyl butoxide emulsifiable concentrate and 2 gallons of water.

Fumigation

To get rid of an infestation that is already established you must fumigate.

Materials to use

Fumigants are sold under various trade names with ingredients listed on the labels. The table shows the ingredients and the recommended dosages of some readily available fumigants. Several others are available. If you use a fumigant not listed in the table, follow the manufacturer's recommendations.

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Applying fumigant to farm-stored grain.

Amount of fumigant to apply per 1,000 bushels of stored grain

Fumigant mixtures	Metal bin			Wood bin		
	Wheat, rye	Shelled corn, oats, barley	Grain sorghum	Wheat, rye	Shelled corn, oats, barley	Grain sorghum
	Gallons	*Gallons*	*Gallons*	*Gallons*	*Gallons*	*Gallons*
80% carbon tetrachloride 20% carbon bisulfide[1]	3	3.5	5	6	7	10
75% ethylene dichloride[2] 25% carbon tetrachloride	3.5	5	--------	7	10	--------
5% ethylene dibromide[2] [3] 35% ethylene dichloride 60% carbon tetrachloride	3	3.5	5	6	7	10

[1] Carbon bisulfide is explosive when used without a fire suppressant such as carbon tetrachloride. Apply when grain temperature is above 60° F.

[2] Apply when grain temperature is above 70° F.

[3] Grain treated with fumigants containing ethylene dibromide should be thoroughly aerated before feeding to laying hens.

How to apply fumigant

Fumigants should be applied only by a trained operator. The operator should wear a gas mask equipped with a fresh canister.

Before you fumigate, make sure that the surface of the grain is level; otherwise, the fumigant will not be evenly distributed. Break up any crust on the surface of the grain.

Apply the fumigant evenly as a coarse spray.

Always have another person present when applying fumigant.

You can apply fumigant to a small amount of stored grain by using a garden sprayer or a bucket-pump sprayer. If you use a garden sprayer, enlarge the opening in the spray disk to the diameter of an 8-penny nail; or, remove the spray nozzle and substitute a nozzle made of a pipe one-fourth inch in diam-

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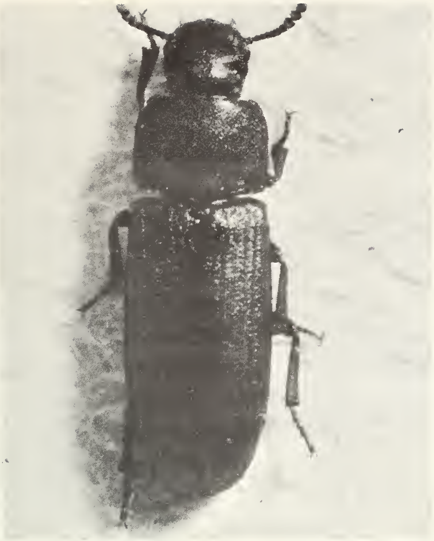
Rice weevil.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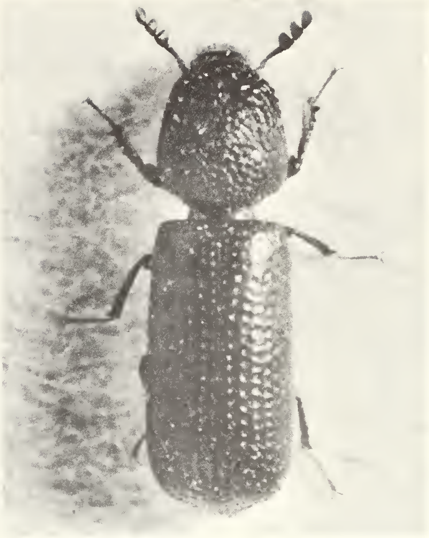
Red flour beetle.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Lesser grain borer.

eter and 6 inches long. Flatten the spray end of the pipe.

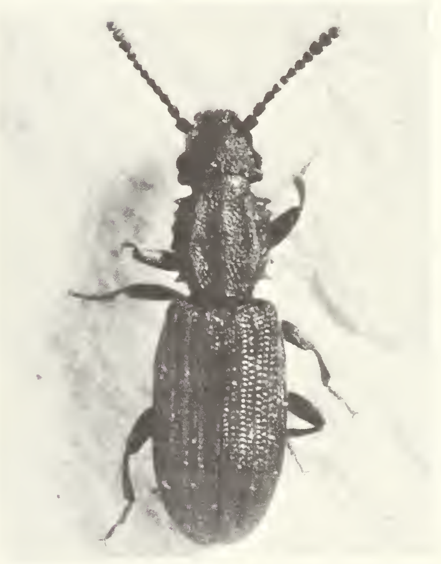
To apply fumigant to a larger amount of grain, use a power spray pump that will apply the fumigant directly from the container in which it is purchased.

All pump fittings should be made of bronze, which resists the corrosive action of fumigants. Hoses and gaskets should be plastic or synthetic rubber.

When to fumigate

Fumigate within 2 weeks after binning the grain if you live in region 4, and within 6 weeks if you live in region 2 or 3. If you live in region 1, fumigate whenever inspection shows that insects are building up.

About once a month, take samples of grain from the center of the bin and inspect them for insects. Sift the samples through a screen that has a mesh large enough to let most kinds of insects fall through but small enough to hold back the grain.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Saw-toothed grain beetle.

(Most stored-grain insects are smaller than the grain.)

Fumigate at once if you find even one granary weevil, rice weevil, or lesser grain borer per quart sample. The granary weevil looks similar to the rice weevil (see photo, page 6) but has elongated rather than round indentations on its head and body.

If insects heat the grain, fumigation will allow it to cool. If heating continues, move the grain to an empty bin.

PRECAUTIONS

Pesticides used improperly can be injurious to man and animals. Follow the directions and heed all precautions on the labels.

Store pesticides in original containers under lock and key—out of the reach of children and animals—and away from food and feed.

Do not apply pesticides in ways that may leave illegal residues.

Avoid prolonged inhalation of pesticide sprays or dusts; wear protective clothing and equipment if specified on the container. Avoid inhalation of fumigant vapors.

If your hands become contaminated with a pesticide, do not eat or drink until you have washed. In case a pesticide is swallowed or gets in the eyes, follow the first aid treatment given on the label, and get prompt medical attention. If a pesticide is spilled on your skin or clothing, remove clothing immediately and wash skin thoroughly.

Do not clean spray equipment or dump excess spray material near ponds, streams, or wells. Because it is difficult to remove all traces of herbicides from equipment, do not use the same equipment for insecticides that you use for herbicides.

Dispose of empty pesticide containers promptly. Have them buried at a sanitary land-fill dump, or crush and bury them in a level, isolated place.

NOTE.—Some States have restrictions on the use of certain pesticides. Check your State and local regulations. Also, because registrations of pesticides are under constant review by the U.S. Department of Agriculture, consult your county agricultural agent or State extension specialist to be sure the intended use is still registered.

PROTECT
Use Pesticides Safely
FOLLOW THE LABEL
U S DEPARTMENT OF AGRICULTURE

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